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Properties Of a Carbamide Composition with A Metal Complex Hardener and Activated Fillers

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Abstract: The article presents analytical materials on the results of studies of chemical patterns and mechanisms of polycondensation reactions occurring in nanostructures of urea composition, the formation of polymer structures, as well as the properties of composite systems by methods of physico-chemical analysis of urea-formaldehyde composition with metal-complex hardener and activated filler.

Keywords: Urea formaldehyde, polymer, activated fillers, heat resistance, composition, metal complex hardener.

Introduction.

At present, all over the world, innovative technologies for the production of energy- and resource-saving, environmentally friendly adhesive compositions based on epoxy, furan, urea-formaldehyde and other polymers play an important role in construction. Research on the creation of effective compositions of adhesive compositions, the study of the features of their structure and application in various sectors of the national economy of the country has a special place. The creation of a system of polymer construction adhesive compositions allows adding various activated fillers and hardeners to the polymer. Particular attention is paid to the creation of new types of activated fillers and hardeners that improve the adhesive properties, heat resistance, durability and technological properties of the glue, ensuring the energy and resource efficiency of their implementation in the production of adhesives.

The world's leading research centers pay great attention to the optimization of the structure of adhesive compositions with high physical, mechanical and technological properties and the development of technologies for their production. One of the most important tasks in order to improve the physical and technical properties, heat resistance, chemical resistance and operational properties of urea-formaldehyde adhesive compositions is the addition of hardeners and activated fillers to their compositions, the study of the chemical bonding of binders, targeted control of the curing process of urea-formaldehyde resins, ensuring the achievement of high strength and heat resistance [1; 2].

Material and methods.

The object of the study was the composition of urea-formaldehyde glue, made on the basis of a metal complex hardener and an activated filler.

The subject of research is the physicochemical factors of the urea-formaldehyde adhesive composition obtained on the basis of a metal complex hardener and an activated filler.

To study the process of structure formation in the composition, modern and effective methods of analysis were used, such as differential thermal analysis (DTA).

Results and discussion.

Thermal analysis makes it possible to identify individual minerals and their quantitative proportions in a mixture, changes occurring in a substance: phase transitions or chemical reactions of the polycondensation process, oxidation, mechanism and rate of reduction. Thermal analysis also records the presence of a process, its thermal (endo- or exothermic) nature and the temperature range in which it occurs.

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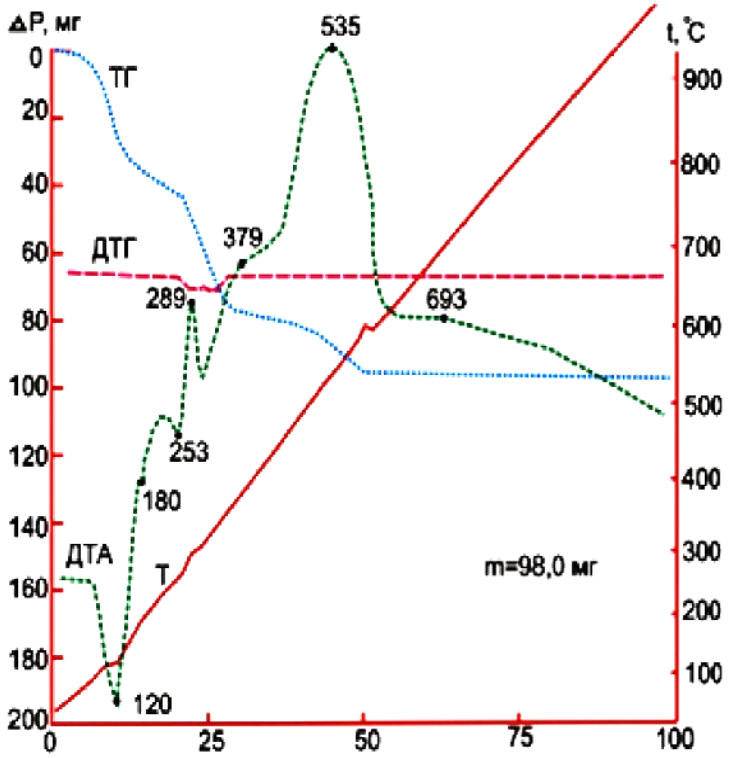

Figure 1. Curves of differential thermal analysis of urea formaldehyde

In Figure 1, we can see from the curves obtained during the heating of the sample, 3 endothermic effects at 120, 180, 253 °C and 4 exothermic effects at 289, 379, 535 and 693°C. At a temperature of 60-900°C, the total weight loss was 99.8% according to thermogravimetric curves.

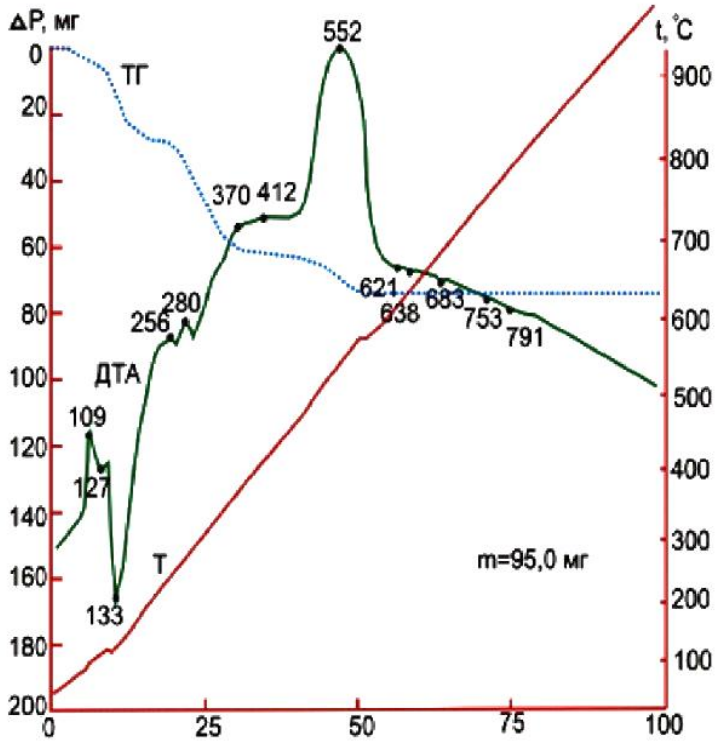

Figure 2. Curves of differential thermal analysis of a urea formaldehyde sample with 1% ammonium chloride (based on the weight of urea formaldehyde)

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Figure 2 illustrates 7 endothermic effects at 127, 133, 621, 638, 683, 753, 791 ° C and 6 exothermic effects at 109, 250, 280, 370, 412 and 552 °C, resulting from the heating process of the sample. On thermogravimetric curves at a temperature of 60-900 °C, the total weight loss was 99.91%.

Figure 3 shows three endothermic effects at 108, 118 and 830 °C according to the curves obtained during heating. It is characterized by the formation of 20 exothermic effects at temperatures of 68, 82, 206, 228, 252, 266, 273, 312, 332, 352, 364, 378, 392, 405, 424, 480, 550, 780, 800 and 814 °C. The total weight loss on thermogravimetric curves at 60-900 ° C was 98.17%.

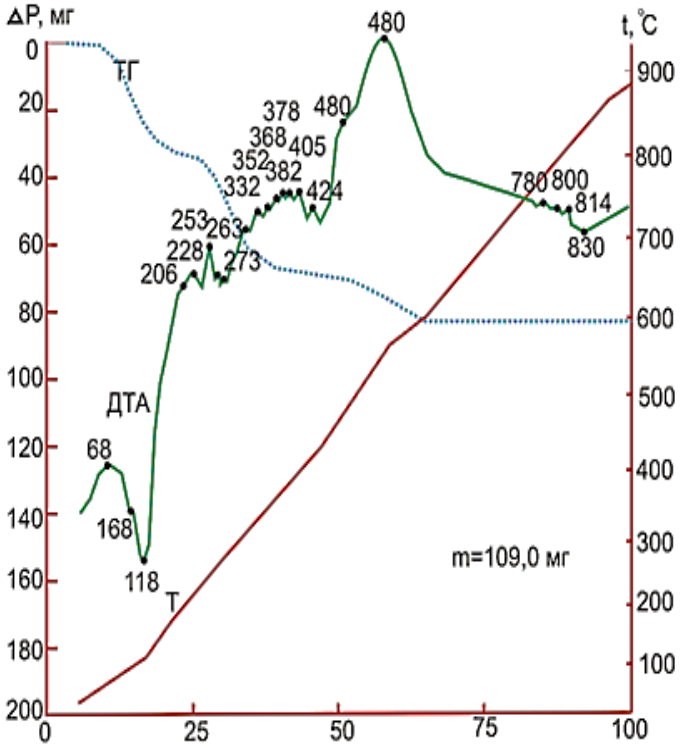

Figure 3. Curves of differential thermal analysis of a urea formaldehyde sample with a metal complex hardener and Na-montmorillonite

Conclusion and acknowledgement. Thus, the thermal stability of the urea adhesive composition depends on the amount of the metal complex hardener and Na-montmorillonite contained in the composition. From this it follows that the composition of urea glue can be used for gluing under a hot press.

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